UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,444	07/11/2001	David E. Dodds	84883-202 ADB	5504

23529 7590 02/25/2005

ADE & COMPANY
1700-360 MAIN STREET
WINNIPEG, MB R3C3Z3
CANADA

EXAMINER	
MERED, HABTE	

ART UNIT	PAPER NUMBER
2662	

DATE MAILED: 02/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/902,444	DODDS ET AL.	
	Examiner	Art Unit	
	Habte Mered	2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-36 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-36 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 11 July 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Canada on 06-07-2001. It is noted, however, that applicant has not filed a certified copy of the 2, 353, 594 application as required by 35 U.S.C. 119(b).

Specification

2. The abstract of the disclosure is objected to because the abstract length is greater than 150 words. Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claim 25 is incomplete.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 4 and 5** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is not clear from reading the claims and further reading the specification

why and how the channels do not need framing information. In the specification on page 52, there is clear explanation on framing information needed for each channel to achieve channel synchronization. However, it is not clear how only one channel needs framing information on the FPGA as the other channels are assumed to participate in upstream and downstream data transmission. In order to further evaluate these claims additional explanation is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1,12 18-25, 27-29, 30-33, 35, and 36** are rejected under 35 U.S.C. 102(e) as being anticipated by Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman. Silberman discloses a system for extending the range of xDSL services. Such a system is shown in Figure 3B. A Central Office (301), a Street Cabinet (305), subscriber lines carrying POTS and DSL signals (308a-e), remote DSL terminal Units (310 a-e), a fiber optic link (316) between the Central Office (CO) and the Street Cabinet, a POTS splitter (307), a means to carry metallic telephone lines to the CO, AFAR-C (302) and AFAR-S (306). See also Column 6, Lines 17-35.

7. Regarding **claim 1**, Silberman discloses ADSL signals to customer premises from a central office, comprising: (**Silberman discloses a system for extending the range of xDSL services. Such a system is shown in Figure 3B. A Central Office (301), a Street Cabinet (305), subscriber lines carrying POTS and DSL signals (308a-e), remote DSL terminal Units (310 a-e), a fiber optic link (316) between the Central Office (CO) and the Street Cabinet, a POTS splitter (307), a means to carry metallic telephone lines to the CO, AFAR-C (302) and AFAR-S (306). See also Column 6, Lines 17-35.**)

a central office (**Figure 3B element 301**);

the central office having a POTS switching system; (**The system shown in Figure 3B shows a trunk cable (313) carrying metallic telephone lines or POTS service to the Central Office and the Central Office must have a switching system capable of handling POTS.**)

the central office having ADSL connection terminals that connect to a data network; (**The Central Office in Figure 3B has ADSL connection terminals (see block 300 in Fig. 3B) and connects to a data network. See Column 1, Lines 51-56 and Column 4, Line 60.**)

a plurality of customer locations at least some of which have at least one frequency POTS terminal and at least one ADSL terminal; (**The remote DSL terminal units (iTU-R 310 a-e) terminate both POTS/voice and ADSL signals at the customer premises. See Column 3, Lines 64-67 and Column 4, Lines 1-5. Since xDSL technology allows the transmission of POTS service signal in the lower**

frequency band and xDSL service signal at higher frequency band, then each customer can have both POTS and ADSL service at a given customer location and transmitted upstream on a single twisted pair of cooper wire.)

a field cabinet associated with the plurality of customers (**a Street Cabinet (305) in Figure 3B**);

a plurality of individual metallic telephone lines each extending from a respective one of the customers to the field cabinet **((See in Figure 3B subscriber lines carrying POTS and DSL signals (308a-e)) The field or street cabinet (305) in Figure 3B is associated with a plurality of customers where individual metallic telephone line (308 a-e) extends from the customers to the street cabinet. See Column 4, Line 61 and Column 5, line 53);**

a trunk cable containing a large number of metallic telephone lines and extending from the field cabinet to the central system; **(The system disclosed by Silberman has a trunk cable or equivalent means of carrying POTS services from the street cabinet to the central office. This cable link is shown in Figure 3B as element number 313. Link 313 contains a large number of unshielded twisted pairs (i.e. metallic telephone) lines. See Column 6, Line 33. Of course, in the field cabinet there must be a plurality of connections for connecting the individual telephone line signals, split from the POTS splitter, to the cable or link 313 that connects the street cabinet to the central office.)**

the field cabinet including a plurality of connections for connecting the individual telephone lines to the trunk cable for connection of signals between the customer

location and the central office; (**Of course, the system disclosed by Silberman has to have some form of an interface unit to take the separated ADSL signal from the POTS splitter to the fiber optic link (316) for the system to work properly. Also, in the system disclosed by Silberman there has to be some form of a connector to connect the separated voice/POTS signals from the POTS splitter to the trunk cable (313).**)

the individual metallic telephone lines each being arranged to transmit both voice frequency POTS signals and ADSL signals between the respective customer location and the field cabinet;**(Silberman discloses that the individual metallic telephone lines are able to transmit both voice /POTS signals and ADSL signals using FDM from the customer premises to the street cabinet. See Column 4, Lines 1-5 and Column 6, Lines 9-16.)**

a bi-directional link separate from the trunk cable for the transmission of ADSL signals between the field cabinet and the central office for connection to the data network; **(Silberman discloses a separate fiber optic link (316 in Figure 3B) that runs between the street cabinet and the central office for carrying ADSL signals. The fiber link 316 is bi-directional because it uses different frequencies for upstream and downstream transmission using FDM and WDM techniques. See Column 5, Lines 14-16 and Lines 24-27. The ADSL signals are then further processed by the DSLAM in the central office and sent to a data network connected to the central office. See Column 3, Lines 59-63)**

a splitter and interface module at the field cabinet having: a plurality of signal splitting coupler units each associated with a respective one of the individual telephone lines and each arranged to separate the ADSL signals and the voice frequency POTS signals from the respective telephone line; **(Silberman discloses that the street cabinet in Figure 3B has a POTS splitter (307) that contains interface modules to split POTS signals from ADSL signals in the upstream direction and couplers to combine these different types of signals in the downstream direction. See Column 6, Lines 25-30.)**.

a plurality of connectors each arranged to connect the separated voice frequency POTS signals between the respective individual telephone line and the trunk cable; (**Of course, the system disclosed by Silberman has to have some form of an interface unit to take the separated ADSL signal from the POTS splitter to the fiber optic link (316) for the system to work properly. Also, in the system disclosed by Silberman there has to be some form of a connector to connect the separated voice/POTS signals from the POTS splitter to the trunk cable (313)).**

a plurality of interface units each associated with a respective one of the coupler units for receiving the separated ADSL signals from the coupler unit and for communicating the bi-directional ADSL signals on the bi-directional link between the central office and the respective individual telephone line. **(Silberman discloses that the street cabinet in Figure 3B has a POTS splitter (307) that contains interface modules to split POTS signals from ADSL signals in the upstream direction and couplers to combine these different types of signals in the downstream direction.**

See Column 6, Lines 25-30. Of course, the system disclosed by Silberman has to have some form of an interface unit to take the separated ADSL signal from the POTS splitter to the fiber optic link (316) for the system to work properly. Also, in the system disclosed by Silberman there has to be some form of a connector to connect the separated voice/POTS signals from the POTS splitter to the trunk cable (313). The POTS splitter has to have ability to split signals as well as combine signals like a coupler for the system disclosed by Silberman to work.)

8. Regarding **Claim 12**, Silberman discloses a system wherein there is provided a plurality of interface units at the telephone central office each of which the bidirectional link associated with a respective individual telephone line and each of which provides an interface between the respective ADSL signals on the bidirectional link and the ADSL terminal of the central office. **(Silberman discloses that the FDM signal received at the Central Office is decomposed into separate subscriber lines at the element 302 in AFAR-C in Figure 3B. See Column 5, Lines 38-40. Silberman further discloses that each individual telephone signal is provided to the DSLAM in the Central office by a number of connections. See Column 5, Line 42. These connections establish the plurality of interfaces between the respective ADSL signals on the bi-directional link and the ADSL terminal in the central office.)**

9. Regarding **claim 18,** Silberman discloses an apparatus wherein there is provided a power supply unit arranged to receive power from each subscriber premises to power its own channel over the tip and ring phone line. **(See Column 6, Lines 30-35)**

10. Regarding **claim 19**, Silberman discloses an apparatus wherein there is provided a power supply unit arranged to receive power from the central office to power the parts of the interface unit common to all channels. **(See Column 6, Lines 30-35)**

11. Regarding **claim 20**, Silberman discloses an apparatus wherein the power supply unit is arranged to receive power from the central office by two tip and ring lines. **(See Column 6, Lines 30-35).**

12. Regarding **claim 27,** Silberman discloses an apparatus wherein the field cabinet receives its power supply from the central office through paired metallic telephone lines including wire pairs that will other wise be used for voice frequency transmission. **(Silberman discloses a system where in Figure 3B, where power-feed and ring voltage are supplied via legacy utp lines (unshielded twisted pairs) (i.e. tip and ring) along with voice lines. See Column 6, Lines 30-35. Therefore, power supply units can be arranged to receive power from each subscriber premises to power its own channel over the tip and ring line. Also, the power supply units at the field cabinet can be powered by the central office using Silberman's disclosure by two tip and ring lines to power the parts of the interface unit that is common to all channel such as AFAR-S.)**

13. Regarding **claim 21**, Silberman discloses an apparatus wherein the central office includes an interface module arranged to transport the ADSL signals on the bi-directional link in a modulated format intended for transmission on the metallic telephone lines and wherein these the interface module at the central office location is arranged to modulate a high frequency carrier and where the carrier is demodulated at

the field cabinet to recover the DSL signal which is the transmitted on the metallic telephone line to the customer location. **(The system disclosed by Silberman includes an interface module (i.e. DSLAM and AFAR-C) configured to transport ADSL signals on the bi-directional link in a modulated format intended for the subscriber lines (i.e. metallic telephone lines). See Column 3, Lines 35-60. Silberman discloses ADSL signals occupy the higher frequencies of the bandwidth associated with the subscriber loop. See Column 1, Lines 42-48. Therefore, the ADSL signals have to be modulated with a high frequency carrier.)**

14. Regarding **claim 22**, Silberman discloses his system is fully functional using any known methods of modulation. See Column 5, Lines 9-16 and Column 7, Lines 5-6.

15. Regarding **claim 23**, Silberman discloses an apparatus wherein the interface units are arranged such that multiple ADSL signals from respective customer locations are combined to a single broadband signal through the use frequency division multiplexing. **(Silberman discloses that his system uses Frequency Division Multiplexing to combine multiple ADSL signals to a single broadband signal. See Column 3, Lines 54-60 and Column 5, Lines 1-4.)**

16. Regarding **claim 24**, Silberman discloses an apparatus where in the interface units are arranged such that a plurality of ADSL signals individually modulate a respective plurality of high frequency carriers separated in frequency by an amount that avoids the interference between the individual ADSL signals. **(Silberman discloses that each of the upstream signals from the subscriber's xTU-R modulates a separate subcarrier. Since the ADSL signals are high frequency signals then they**

individually have to be modulated with a high frequency carrier. The fact that the carriers are separated in frequency to prevent interference is a benefit of the modulation technique used and Silberman's system is not limited by the choice of modulation techniques. See Column 4, Lines 65-67 and Column 1, Lines 42-48.)

17. Regarding **claim 25**, Silberman discloses an apparatus wherein the interface units are arranged such thatpower failure or failure in the ADSL transmission equipment does not impair the POTS service. **(Silberman discloses a method by where power-feed and ring voltage are supplied via legacy UTP lines not to impair POTS service like lifeline service guarantee even if power failure or ADSL transmission equipment failure. See Column 6, Lines 20-35.)**

18. Regarding **claim 28,** Silberman discloses a system wherein the central office and the interface module are arranged such that the ADSL signals are communicated, in their modulated format, over the bi-directional link between the central office and field cabinet and wherein the ADSL signals are sampled and converted to digital format as preparation for transmission on the optical link and where, after transmission, the DSL signals are recovered without substantial loss in amplitude and signal-to noise-ratio. **(Silberman discloses how the ADSL signals are transported from the CO to the field cabinet. The ADSL signals are modulated transported over the fiber optic link using a transceiver. Silberman discloses his system is not limited to a particular modulation technique and can reap benefits like low SNR that are associated with the modulation technique chosen like any other system.**

Modulation and demodulation techniques are aspects of the art that are very well known. See Column 3, Lines 35-60, Column 5, Lines 10-15, and Column 7, Line 6)

19. Regarding **claim 29**, Silberman discloses a system wherein the central office and the interface module are arranged such that the ADSL signal at the central office is directly obtained from the digital subscriber loop multiplexer in a sampled digitized format suitable for digital multiplexing and transmission on the transmit and receive channels of the bi-directional fiber optic link. **(Silberman discloses how the ADSL signals are transported from the CO to the field cabinet. The ADSL signals are modulated transported over the fiber optic link using a transceiver. Silberman discloses his system is not limited to a particular modulation technique and can reap benefits like low SNR that are associated with the modulation technique chosen like any other system. Modulation and demodulation techniques are aspects of the art that are very well known. See Column 3, Lines 35-60, Column 5, Lines 10-15, and Column 7, Line 6)**

20. Regarding **claim 31**, Silberman discloses a system wherein the central office and the interface module are arranged such that the sampled ADSL signals are digitized to allow efficient transmission on the link. **(Silberman discloses how the ADSL signals are transported from the CO to the field cabinet. The ADSL signals are modulated transported over the fiber optic link using a transceiver. Silberman discloses his system is not limited to a particular modulation technique and can reap benefits like low SNR that are associated with the modulation technique chosen like any other system. Modulation and**

demodulation techniques are aspects of the art that are very well known. See Column 3, Lines 35-60, Column 5, Lines 10-15, and Column 7, Line 6)

21. Regarding **claim 32**, Silberman discloses a system wherein the central office and the interface module are arranged such that the analog ADSL signal is sampled and digitized for transmission on the link using those AID converters specifically designed for commercial DSL modems. **(Silberman discloses how the ADSL signals are transported from the CO to the field cabinet. The ADSL signals are modulated transported over the fiber optic link using a transceiver. Silberman discloses his system is not limited to a particular modulation technique and can reap benefits like low SNR that are associated with the modulation technique chosen like any other system. Modulation and demodulation techniques are aspects of the art that are very well known. See Column 3, Lines 35-60, Column 5, Lines 10-15, and Column 7, Line 6)**

22. Regarding **claim 30**, Silberman discloses wherein the central office and the interface module are arranged such that the ADSL signal at the central office is obtained from the DSLAM in a continuous time analog format in the bidirectional two-wire transmission form normally transmitted on metallic telephone lines. **(Silberman discloses that the ADSL signal obtained from the DSLAM and intended to be sent to the subscriber is in analog format. See Column 3, Line 42.)**

23. Regarding **claim 33**, Silberman discloses wherein the central office and the interface module are arranged such that multiple ADSL signals are combined to a single high-speed signal through the use of time division multiplexing. **(Silberman**

discloses a method where by ADSL signals are combined using FDM. Silberman discloses the advantage of using FDM is for analog systems and TDM is for digital systems. Therefore, based on the type of the system chosen an optimal multiplexing method can be chosen. See Column 1, Lines 35-40.)

24. Regarding **claims 35**, Silberman discloses a system wherein the bidirectional link comprises a fiber optic link, which utilizes digital transmission components designed for use with Gigabit Ethernet. **(Silberman discloses that his system will be fully functional if the fiber optic link between the Central Office and the field cabinet is replaced by any broadband communication link that can operate using FDM. Both Gigabit Ethernet and SONET are broadband communication links that can use FDM. See Column 6, Lines 50-55.)**

Regarding **claim 36**, Silberman discloses wherein the bidirectional link comprises a fiber optic link, which utilizes digital transmission components designed for use with SONET. **(Silberman discloses that his system will be fully functional if the fiber optic link between the Central Office and the field cabinet is replaced by any broadband communication link that can operate using FDM. Both Gigabit Ethernet and SONET are broadband communication links that can use FDM. See Column 6, Lines 50-55.)**

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. **Claims 2-3, 6-10, and 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman in view of Fischer et al (US Pub. No. 2002/0163932), hereinafter referred to as Fischer.

27. Regarding **claim 2**, Silberman teaches all aspects of the claimed invention as set forth in the rejection of claim 1 but fails to teach that there can be clock synchronization in both directions provided one end supplies the master clock and the other end recovers the clock from the transmitted data.

Fischer discloses an apparatus wherein the interface units at the field cabinet and the central office have a common receive and transmit clock and are synchronized in both directions providing precise loop timing where one end supplies the master clock for the channel and the clock is recovered at the other end, used to receive the data, cleaned up and used to send the data back. (**Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer teaches that the receive and transmit clock are synchronized in both directions where one supplies the master clock for the channel and the clock is recovered at the other end. See Paragraphs 12 and 13.**)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate clock

synchronization, the motivation being that to allow proper synchronization between the various components of the asynchronous network containing the POTS signal, the ADSL modem and the fiber optic transceivers.

28. Regarding **claim 3**, the modified invention of Silberman and Fischer as taught above disclosed the aforementioned invention but does not disclose that the framing information is continuously scrutinized at the receiving end to assure that the channels are not scrambled in transit.

Fischer discloses an apparatus wherein the interface units at the field cabinets and the central office are arranged such that the framing information is continuously scrutinized at the receiving end to assure that channels are not scrambled in transit. **(Fischer discloses that the transmitting side does not scramble some of the frame control information embedded in the frame. Frame control information is in effect the framing information. EOF (End Of Frame) is an example of frame control information contained in a frame. It is obvious to one having ordinary skill in the art that the receiving side has to continuously scrutinize the framing information to determine for instance the end of a frame being processed and the start of a new frame and if the frames have been received in order. See Paragraphs 123 and 143.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's and Fischer's modified invention to embed control information in the frames transmitted, the motivation being that to allow proper

frame synchronization between the various components of the asynchronous network containing the POTS signal, the ADSL modem and the fiber optic transceivers.

29. Regarding **claim 34**, Silberman teaches all aspects of the claimed invention as set forth in the rejection of claim 1 but fails to teach that there can be clock synchronization in both directions provided one end supplies the master clock and the other end recovers the clock from the transmitted data. Silberman fails to teach that the slave clock PLL has a very low closed loop bandwidth so that spectral smearing has no noticeable effect on the system performance.

Fischer discloses an apparatus wherein the central office and the interface module are arranged such that the transmit and receive samples are synchronized together using loop timing to ensure that there is no carrier phase shifts that result in spinning of the constellation over time, with a master clock and a slave clock, the slave clock PLL has a very low closed loop bandwidth so that spectral smearing has no noticeable effect on the system performance. (**Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer teaches that the receive and transmit clock are synchronized in both directions where one supplies the master clock for the channel and the clock is recovered at the other end. Fischer discloses that the slave clock has very low closed loop bandwidth and large constellations are used to achieve high spectral efficiency. See Paragraphs 12, 13, and 142.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate clock synchronization, the motivation being that to allow proper synchronization between the various components of the asynchronous network containing the POTS signal, the ADSL modem and the fiber optic transceivers.

30. Regarding **Claim 6**, the modified invention of Silberman and Fischer as taught above disclosed the aforementioned invention but does not disclose once each ADSL symbol period, the least significant bit of one channel's digit sample carries embedded framing information and in each symbol period, the digital value of this bit is overridden by the current value of a known pseudo random bit stream.

Fischer discloses wherein once each ADSL symbol period (250 us), the least significant bit (LSB) of one channel's digital sample carries embedded framing information and in each symbol period, the digital value of this bit is overridden by the current value of a known pseudo random bit stream (PRBS). **(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer further discloses a scrambling method where the digital value of the least significant bit is replaced by the current value of the known pseudo random bit stream. See Paragraphs 123, 142 and 143.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's and Fischer's modified to use a known

pseudo random bit stream to replace the digital value of the LSB of the periodically sampled channel, the motivation being able to eliminate the problem of tones in the power spectral density from highly correlated successive packets. The use of pseudo random initial scrambler state results in a more uniform power spectral density measured over multiple similar frames.

31. Regarding **claim 7**, the modified invention of Silberman and Fischer as taught above disclosed the aforementioned invention but does not disclose the interface units are arranged to provide a maximal length sequence wit a 15 bit period using a four bit linear shift register.

Fisher discloses an apparatus wherein the interface units are arranged to provide a maximal length sequence with a 15 bit period using a four bit linear feedback shift register (LFSR). **(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer further discloses a maximal length sequence with n bit period using a simple four-bit linear feedback shift register. See Paragraph 142.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's and Fischer's modified to use a linear feedback shift register to generate a pseudo random bit stream to replace the digital value of the LSB of the periodically sampled channel, the motivation being able to come up with an effective scrambling method to reduce the probability of harmful interference.

32. **Regarding claim 8**, the modified invention of Silberman and Fischer as taught above disclosed the aforementioned invention but does not disclose a sequence is used for each FPGA and fails to provide an equation for each sequence.

Fischer discloses wherein two independent sequences are used (one for each FPGA) and the same sequence is used for both upstream and downstream directions of a particular channel, where the sequences are defined by the following equations: XO = X3 XNOR X4, and XO = X1 XNOR X4 and both sequences are seeded with all zeros.

(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer further discloses two FGPA can be used to implement his system. See Paragraph 116. Fischer further discloses an equivalent equation for generating the sequence and shows how it is implemented in the scrambler shown in Figure 11. The sequences are used for both upstream and down stream directions. There is no unique advantage stated by the applicant to use the particular sequence and Fischer's sequence would serve the same purpose. See Paragraph 144.)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's and Fischer's modified to use two independent sequences for each FPGA in both directions, the motivation being able to come up with an effective scrambling method to reduce the probability of harmful interference.

33. **Regarding claim 9**, the modified invention of Silberman and Fischer as taught above disclosed the aforementioned invention but does not disclose a method for detecting frames with errors and the remedial action to be taken.

Fischer discloses a system wherein the receiving end discriminates against invalid sequences by monitoring the a moving window of the four most recent bits of the bit stream and the discriminator tolerates no more than one bit error in the window and treats the case of two or more errors in the window as a framing error and therefore take corrective measures.

(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer discloses a very flexible method where frame error rates can be negotiated between the sender and the receiver. Therefore it is possible to implement a system that discriminates against invalid sequences by monitoring a moving window of the four most recent bit stream and where only one bit error in the window is allowed. Fischer describes where a corrective method is under taken using the method called Limited Automatic Repeat Request. See Paragraphs 216 and 304.)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's and Fischer's modified to use frame error rate negotiations and limited automatic repeat request, the motivation being able to maximize network throughput subject to frame error rate constraints.

34. **Regarding claim 10**, Silberman teaches all aspects of the claimed invention as set forth in the rejection of claim 1 but fails to teach that the interface units are arranged to use fixed gains (unity) for both downstream and upstream paths.

Fischer discloses a system wherein the interface units are arranged to use fixed gains (unity) for both downstream and upstream paths. **(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer further discloses that for such systems fixed gain (unity) for both downstream and upstream paths can be achieved. See Paragraph 302.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate fixed gain design, the motivation being able to design analog to digital converter that adequately meets the dynamic range requirements of the signal propagation path at a minimum cost.

35. **Claims 11 and 17 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman in view of Fischer et al (US Pub. No. 2002/0163932), hereinafter referred to as Fischer, and Langford et al (IEEE, 1998, A BiCMOS Analog Front-End Circuit for an FDM-Based ADSL System), hereinafter referred to as Langford.

36. Regarding **claim 11**, Silberman discloses a system where it has a DSLAM at the CO and ADSL Terminal Units at the customer premises. The ADSL TU and the

DSLAM convert the digital signal into analog signal and vice versa and must contain D/A and A/D converters and are therefore ADSL CODECs. See Column 3, Lines 35-65. Silberman also discloses use of a fiber optic transceiver in both directions. See Column 3, Line 45 and Column 5, Line 3. A transceiver has to have a receiver and a transmitter. The transmitter can contain some form of line driver depending on the distance of the fiber link.

Silberman, however, fails to expressly disclose that his system has an IEEE 802.3 compliant laser transceiver modules and a serializer/deserializer. Silberman does not disclose that the transceiver in his system has line drivers and receivers.

Fischer discloses a system wherein the interface units include Gigabit Ethernet (IEEE 802.3 compliant) laser transceiver modules and serializer-deserializers (SERDES). **(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6. Fischer discloses system that is fully compliant with IEEE 802.3 and uses a transceiver. See Paragraphs 110 and 134. Fischer further discloses a serializer/deserializer that converts words (i.e. symbols) to bits and vice versa in Figure 5 when implementing an efficient scrambling system. Element 530, the encoder, is the serializer. See Paragraphs 110, 134, and 146.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate a serializer with an

IEEE 802.3 transceiver, the motivation being implementing an efficient scrambling system that meets the standard bodies quality of service.

Langford discloses a system with ADSL coder-decoders (CODEC) and line drivers/receivers. **(Langford shows a typical ADSL application. The transceiver in Figure 2 clearly contains line driver and receiver.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate a transceiver with receiver and a line driver, the motivation being to use it to transmit signals over a short haul communications.

37. Regarding **claim 17**, Silberman disclosed the aforementioned invention but does not disclose what happens when frame synchronization is lost wherein a serializer/deserializer is in use.

Fischer discloses a system wherein serializer/deserializer also is arranged such that if frame synchronization is lost, then the communication link is recreated by a protocol, whereby if a transceiver loses frame synchronization, it simply ceases transmission to the other transceiver, then the other transceiver will receive idle characters, signaling it to restart transmission and such that once the original transceiver detects frame synchronization, it will begin transmitting data again, and the link will be re-established. **(Fischer discloses a method of providing synchronous transport of packets between asynchronous network nodes in a frame based communications network. Fischer's method is applicable to systems that use ADSL modems and is applicable to Silberman's invention. See Paragraph 6.**

Fischer discloses system that is fully compliant with IEEE 802.3 and uses a transceiver. See Paragraphs 110 and 134. Fischer further discloses a serializer/deserializer that converts words (i.e. symbols) to bits and vice versa in Figure 5 when implementing an efficient scrambling system. Element 530, the encoder, is the serializer. See Paragraphs 110, 134, and 146.

Fischer further discloses a frame synchronization mechanism, which he identifies as LARQ (Limited Automatic Repeat Request). When frame synchronization loss is detected by the transceiver it ceases transmission and the other transceiver sends specific message from ones defined in table 53 to restart transmission. See Paragraph 216.)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate a serializer with an IEEE 802.3 transceiver and a frame synchronization protocol like LARQ, the motivation being implementing an efficient scrambling system that meets the standard bodies quality of service.

38. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman in view of Langford et al (IEEE, 1998, A BiCMOS Analog Front-End Circuit for an FDM-Based ADSL System), hereinafter referred to as Langford.

Silberman discloses that his system converts each analog signal received from the telephone line to digital signal for transmission on the optical link and vice versa. **(See Column 3, Lines 54-60 and Column 5, Lines 38-46.)** Silberman describes the

apparatus to convert the signals from digital to analog and vice versa and multiplex and demultiplex each subscriber signals as AFAR-C at the CO and AFAR-S at the subscriber location.

Silberman fails to expressly disclose, that the AFAR-C and AFAR-S contain an analog front end to accomplish the task of signal conversion from digital to analog and vice versa.

Langford discloses a system wherein each interface unit includes an analog front end unit for converting between analog signals transmitted to and received from the individual telephone line and digital signals for transmission on and receipt from the bi-directional link. **(Langford shows an analog front end used in a system utilizing ADSL signals in Figure 1. Figure 1 shows a block diagram of an analog front end. It shows a block with digital to analog converter (DAC). Figure 2 shows a typical application and has an analog to digital converter (ADC) and a DAC.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate an analog front end with low noise and high MTPR, the motivation being to get a combination of high linearity and low noise to maximize the length of twisted pair copper wire over which the system can transmit while maintaining low BER.

39. **Claims 14-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman in view of Langford et al (IEEE, 1998, A BiCMOS Analog Front-End Circuit for an FDM-Based

ADSL System), hereinafter referred to as Langford, in further view of Fischer et al (US Pub. No. 2002/0163932), hereinafter referred to as Fischer.

37. Regarding **claim 14**, the modified invention of Silberman and Langford as taught above disclosed the aforementioned invention but does not disclose that the output of the analog front end interfaces with a parallel to serial converter before sending the signal to the fiber optic link.

Fischer discloses wherein the analog front end generates parallel data and wherein there is provided interface components for converting between the parallel data and a serial digital signal for communication on the bi-directional link. **(Fischer further discloses a serializer/deserializer that converts words (i.e. symbols) to bits and vice versa in Figure 5 when implementing an efficient scrambling system. Element 530, the encoder, is the serializer. See Paragraphs 110, 134, and 146. It is important to note that the analog front end available for commercial use can either generate parallel or serial data. Further it is important to note that the transceiver available for commercial use can take as an input serial or parallel data. However, Fisher teaches a serial to parallel converter (i.e. bits to symbol) and vice versa in Figure 5 which can serve as the interface between the analog front end and the transceiver on the fiber optic link.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate a serializer with an IEEE 802.3 transceiver, the motivation being implementing an efficient scrambling system that meets the standard bodies quality of service.

40. Regarding **claim 15,** the modified invention of Silberman and Langford as taught above disclosed the aforementioned invention including the fact that the analog front end comprises an ADSL CODEC and filters. By definition an ADSL CODEC is simply the combination of the D/A and A/D entities. Langford shows the A/D and D/A entities in the block diagrams for an analog front end in Figures 1 and 2. In Figures 1 and 2 Langford discloses that the analog front end contains filters too.

39. Regarding **Claim 16**, the modified invention of Silberman and Langford as taught above disclosed the aforementioned invention but does not disclose that the output of the analog front end interfaces with a parallel to serial converter.

Fischer discloses wherein the interface components include a serializerl/de-serializer unit arranged to receive the parallel digitized ADSL signals and serialize them onto a single bit stream and to receive a serial bit stream and generates therefrom parallel data. **(Fischer further discloses a serializer/deserializer that converts words (i.e. symbols) to bits and vice versa in Figure 5 when implementing an efficient scrambling system. Element 530, the encoder, is the serializer. See Paragraphs 110, 134, and 146. It is important to note that the analog front end available for commercial use can either generate parallel or serial data. Further it is important to note that the transceiver available for commercial use can take as an input serial or parallel data. However, Fisher teaches a serial to parallel converter (i.e. bits to symbol) and vice versa in Figure 5 which can serve as the interface between the analog front end and the transceiver on the fiber optic link.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate a serializer with an IEEE 802.3 transceiver, the motivation being implementing an efficient scrambling system that meets the standard bodies quality of service.

41. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Silberman et al (US 6, 829, 246), hereinafter referred to as Silberman in view of Say (US PUB No. 20020101852).

Regarding **claim 26**, Silberman teaches all aspects of the claimed invention as set forth in the rejection of claim 1 but fails to teach ADSL line sharing by customers statistically multiplexed.

Say discloses a system wherein the interface units are arranged such that the ADSL signals are not concentrated, as in statistical multiplexing, and that all customers may simultaneously utilize the full ADSL bit rate. **(Say shows a POTS/ ADSL line sharing service in Figure 4. Customers 220 and 240 have simultaneous access to the ADSL signal coming on the twisted pair 250. See Paragraph 23.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Silberman's invention to incorporate POTS/XDSL line sharing, the motivation being to provide POTS/xDSL services from different service providers to multiple subscribers over the same twisted wire pair.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

42. **Claim 1** is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 14 of copending Application No. 09/612,445. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application and the pending application '445 both claim an apparatus for distributing ADSL signals to customer premises from a central office. The only obvious difference between the instant application and the pending application '445 is are as follows:

a) that the independent claim14 of the pending application '445 claims "a field cabinet remote from the central office associated with the plurality of customers locations" which is an obvious variation from the "a field cabinet associated with the plurality of customers" as claimed in the instant application.

b) that the independent claim 14 of the pending application '445 claims " a bi-directional link separate from the trunk cable for the transmission of ADSL signals in a modulated analog form between the field cabinet and the central office for connection to the data network" which is an obvious variation from " a bi-directional link separate from the trunk cable for the transmission of ADSL signals between the field cabinet and the

central office for connection to the data network" as claimed in the instant application. The limitations are obvious variation of one another because they are using different well-known modulation techniques on the same apparatus without additional non-obvious benefits.

c) that the independent claim 14 of the pending application '445 claims "the ADSL terminals at the central office including ADSL modems arranged to communicate the ADSL signals in their modulated analog form over the bi-directional link" and is simply stating a specific modulation technique while the instant application covers all forms of modulations the one modulated in analog form.

d) that the independent claim 14 of the pending application '445 claims "a splitter and interface module at the field cabinet, remote from the central office having" which is an obvious variation from the "a splitter and interface module at the field cabinet having" as claimed in the instant application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Habte Mered whose telephone number is 571 272 6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571 272 3088. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HM
2-02-05

KENNETH VANDERPUYE
PRIMARY EXAMINER